

## THE GENUS EUARESTA IN THE UNITED STATES (DIPTERA: TEPHRITIDÆ)

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### INTRODUCTION<sup>1</sup>

No previous attempt has been made to bring together all the species of the genus *Euaresta* Loew that occur in the United States. It is the purpose of this paper, therefore, to present re-descriptions of all the species, to attempt to establish more firmly the limits of the genus, and to offer a key and illustrations as aids in identification and separation.

Since Loew's (11) proposal of *Euaresta* a large number of species have been placed in the genus with much disagreement among authors as to the generic limits. Benjamin (1) in his study of the Tephritidæ of Florida gave a partial review of the literature concerning *Euaresta* and proposed a new subgeneric name, *Setigeresta*, for *aqualis* Loew. He also considered *Camarmyia*, a genus proposed by Hendel for *bullans* Wiedemann, as being a subgenus of *Euaresta*. In the same year Curran (7) proposed the inclusion of *Euaresta* under *Tephritis* citing the intergrading of the wing patterns as a basis for the synonymy, with a reduction of the brown color leading to *Tephritis*. Previous to this Cresson (6) had suggested that *Euaresta* be placed as a subgenus of *Tephritis*, but that plan was not followed in his paper. Only one key for the separation of the species occurring in the United States has appeared in the literature, and that being given by Phillips (12) in her study of the Tephritidæ of Northeastern America.

The writer wishes to express his sincere appreciation and thanks to the following persons for assistance given during this study: to Dr. F. A. Fenton under whose direction this study was carried out; to Dr. Alan Stone whose kindly interest, helpful

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suggestions, criticisms, and valuable information concerning the Coquillett types have contributed much to this study; to Dr. J. Bequaert for making comparisons with certain of the Loew types; to Dr. C. H. Curran for information concerning the type of *jonesi*; to Ester Norman, reference librarian at the University of Kansas, for information concerning certain of the literature; to Dr. H. B. Hungerford and Dr. R. H. Beamer for their kind cooperation given the writer while studying the cotypes of *bellula* Snow in the Snow Entomological Collection; to Dr. M. T. James for many helpful suggestions and criticisms; and to the following institutions and individuals for the loan of material: the United States National Museum, the American Museum of Natural History, the California Academy of Sciences, Utah State College, Washington State College, Colorado A. and M. College, Texas A. and M. College, the University of Kansas, Kansas State College, the University of Nebraska, Stanford University, and Mr. S. C. Jones, Corvallis, Oregon.

#### THE ILLUSTRATIONS

Accuracy of proportion of the wings was obtained by the use of a sixteen millimeter projector. The wings were mounted on slides and from these images were focused directly on the drawing paper. The outlines of the veins and patterns were then traced and the details put in with the aid of a binocular microscope. The same procedure was used in preparing the drawings of the antennæ and palpi except that a drawing prism attached directly to a compound microscope was used in place of a projector in producing a magnified image. Drawings of the heads and male genitalia were made with the aid of a micrometer disc ruled in squares and coordinate paper.

#### SPECIES INCORRECTLY PLACED IN THE GENUS

*Euaresta tricolor* Doane, a specimen of which was kindly loaned by Dr. M. T. James, belongs to *Gymnocarena*, a genus proposed by Hering (9) for *diffusa* Snow.

The correct generic position of the following three Coquillett species is not known to the author: *Euaresta munda*, *Euaresta mundula*, and *Trypeta (Euaresta) californica*. The presence of

but one pair of scutellar bristles, however, would exclude them from *Euaresta* as the genus is defined here. Specimens sent to Dr. Stone for comparison with the type of *munda* proved to agree closely with that species except that the legs were somewhat lighter than exhibited by the type. The genitalia of the males assigned to *munda* by the author do not possess the striations on the distal area as found in *Euaresta*.

Benjamin (1) placed *Euaresta pura* Loew and *Euaresta sub-pura* Johnson in *Tephritoides* a subgenus of *Trupanea*. Hering (10) places these species in *Tephritis* and the author is inclined to agree with this treatment.

Several authors have followed Coquillett (2, 3, 5,) in placing the following species in *Euaresta*: *Tephritis webbii* Doane, *Tephritis rustipennis* Doane, and *Trypeta (Euaresta) araneosa* Coquillett. A comparison of specimens of these species with the genotype of *Tephritis, arnicae* Linnæus, has led the author to consider them congeneric.

*Tephritis angustipennis* (Loew) : This species, a true *Tephritis*, was placed in *Euaresta* by Phillips (12).

#### THE GENUS *EUARESTA* LOEW

*Trypeta (Euaresta)* Loew, Smithsn. Inst. Misc. Collect., 11 (256) : 296, 1873.

*Euaresta* Loew: Coquillett, Proc. U. S. Nat. Mus., 37 (1719) : 540, 1910. (Genotype, *Trypeta festiva* Loew).

*Camaromyia* Hendel, Wiener Ent. Ztg., 33 (3-4) : 95, 1914: (Dresden) K. Zool. u. Anthrop.—Ethnog. Mus Abhandl. u. Ber., Bd. 14, Nr., 3. 63, 1914. (Genotype, *Trypeta bullans* Wiedemann.)

*Euaresta* Loew: Phillips, Jour. N. Y. Ent. Soc., 31 (3) : 145, 1923.

*Euaresta (Camaromyia)* Hendel: Benjamin, U. S. Dept. Agr. Tech. Bul., (401) : 50, 58, 1934.

*Euaresta (Setigeresta)*: Benjamin, U. S. Dept. Agr. Tech. Bul., (401) : 50, 1934. (Subgenotype, *Trypeta aequalis* Loew).

*Tephritis* Latreille; Curran, Amer. Mus. Nov., (556) : 1, 1932; The families and genera of North American Diptera, Ballou Press, New York, p. 291, 1934. (in part)

Generic characters.—Head: Higher than long and wider than high; width of vertex across median ocellus usually slightly more than half the maximum head width, but occasionally slightly less; frons tapering anteriorly, varying from a nearly flattened to a quite tumid condition; face slightly concave; oral cavity rounded, drawn up anteriorly; eyes ovate; antennæ rather short, not extending beyond the oral margin (except occasionally in males of *bullans* (Wiedemann)); second segment with a rather conspicuous median seta; arista very finely pubescent; palpi flattened, ventral margin somewhat convex; proboscis short, moderately fleshy; two pairs lower fronto-orbitals;<sup>2</sup> two pairs upper fronto-orbitals, the posterior pair weak; one pair strong ocellars; one pair inner verticals; one pair outer verticals which are shorter than inner pair, usually between one-third to two-thirds their length; one pair postverticals; postocular cilia rather stout, interspersed with some shorter setæ; genal bristle slender, inconspicuous.

Thorax: Dorsum, propleura, mesopleura, sternopleura, and pteropleura with short, flattened setæ; a small spot on each side below postalar bristle is black; scutellum flattened dorsally; two pair dorsocentrals, one pair near transverse suture and well ahead of a transverse line through supraalars, and one pair lying slightly ahead of a transverse line through intraalars; one pair intraalars; one pair humerals; one pair presutrals; one pair supraalars; two pairs notopleurals; one pair postalars; two pairs marginal scutellars,<sup>3</sup> one pair near apex, one pair near base; one pair mesopleurals; one pair pteropleurals; one pair sternopleurals.

Legs: Front femora with a row of strong setæ on ventral side and two somewhat parallel rows of shorter setæ laterodorsally; middle femora with a row of shorter setæ on anterior side that extend from near the base to about the center; hind femora with a few suberect, short setæ at apex dorsally; middle tibiæ each with one strong apical spur; hind tibiæ with a fringe of short setæ laterodorsally; front femora swollen in males.

<sup>2</sup> Two specimens, one each of the following species, *stigmatica* and *bellula*, were found to have a third bristle present on the left side only.

<sup>3</sup> One specimen of *bella* possessed an extra, though somewhat weaker, marginal bristle on the left side.

Wing: The dark design marked with rounded spots and marginal indentations which form a somewhat radiate pattern at apex; first posterior cell usually with a distinct bulla, but occasionally absent, variable; two strong costal setæ; first longitudinal vein strongly setose except on a short area below apex of auxiliary vein, third with scattered weak setæ on dorsal and ventral sides that are quite variable in size and number.

Abdomen: About equal in length with thorax; ovipositor sheath conical or flattened, tapering apically; male genitalia rather large, claspers stout and bearing two short teeth on either side on inner posterior surface (usually hidden in side view by the hoodlike extension of the apical ends of the claspers), conspicuously striated on either side of anal area.

Benjamin (1) separated *Camaromyia* and *Setigeresta* from *Euaresta* s. str. by the lack of a bulla in the first posterior cell in the case of *Camaromyia*, and by the presence of a knob at the junction of the second and third veins, a definitely bristly third vein, and the lack of a bulla in the first posterior cell in the case of *Setigeresta*.

Evidence gained in a study of one hundred and ninety-two specimens of *æqualis* has shown that the number and size of setæ found on the third vein is subject to much variation. The extent of variation ranged from those individuals in which no evidence of setæ could be found, to those in which the vein was definitely setose. A comparable condition was found to exist in specimens of *festiva*. In general the remaining species included in this study exhibited a lesser number of setæ on the third vein, but here again the number was found to be quite variable.

The enlargement at the junction of the second and third veins seemed to offer no basis for the separation of *æqualis* from the other species. The same enlargement was found in the others but with the exception of *festiva* was somewhat more difficult to ascertain, probably due to the smaller size of the individuals.

The series of specimens of *æqualis* revealed one (a female from Three Rivers, California, August 5, 1940 (E. E. Kenega), in the Snow Entomological Collection at Kansas University) in which there was a small but conspicuous bulla in the third posterior cell of the left wing only. No trace of a bulla was found in those specimens of *bullans* which were examined, while the

remaining six species were found to have a definite bulla present in most cases. This character was quite variable in *tapetis*, however, and in many specimens of this species the bulla was completely absent.

The structure of the ovipositor sheath was found to vary quite markedly between a flattened and a conical condition. Females in each species studied showed a wide range of variation between these two conditions. In most cases the tendency seemed to be towards a conical condition and it is probable that in these cases the flattened condition was due to the effect of drying or perhaps the stage at which the insect was killed.

The structure of the head revealed remarkable variations (Fig. 1, C-G). In a profile view *aqualis* and *tapetis* appear much the same in general outline but the broad cheeks and parafacials of the former distinguishes that species. While the frons of *tapetis* are normally quite tumid, individuals were found in which the character was so reduced that the head appeared much as that shown in the figure of *festiva*. The tumid condition of the frons in *aqualis* is normally more pronounced than is shown in the figure. In *bullans* the frons usually bulges somewhat beyond the eyes anteriorly and the face is somewhat more receding than found in the other species. The structure of the heads of the remaining species conform more to that shown in the figure of *festiva* except for *stigmatica* (Fig. 1, D) which has the frons slightly more flattened.

The structure of the male claspers (Fig. 1, A-B) shows a series of conspicuous, oblique striations on the distal surface that will serve to set this group apart from otherwise closely related genera. The whole external genitalia are large and conspicuous and except for size seemed to vary but little in general structure in all of the species examined.

The structure of the arista and the presence of but one subhyaline spot at the apex of the submarginal cell in *bullans* are in contrast to the typical condition of *Euaresta*. However, the possession by the males of the peculiarly constructed genitalia leads the author to refrain from removing that species from the genus.

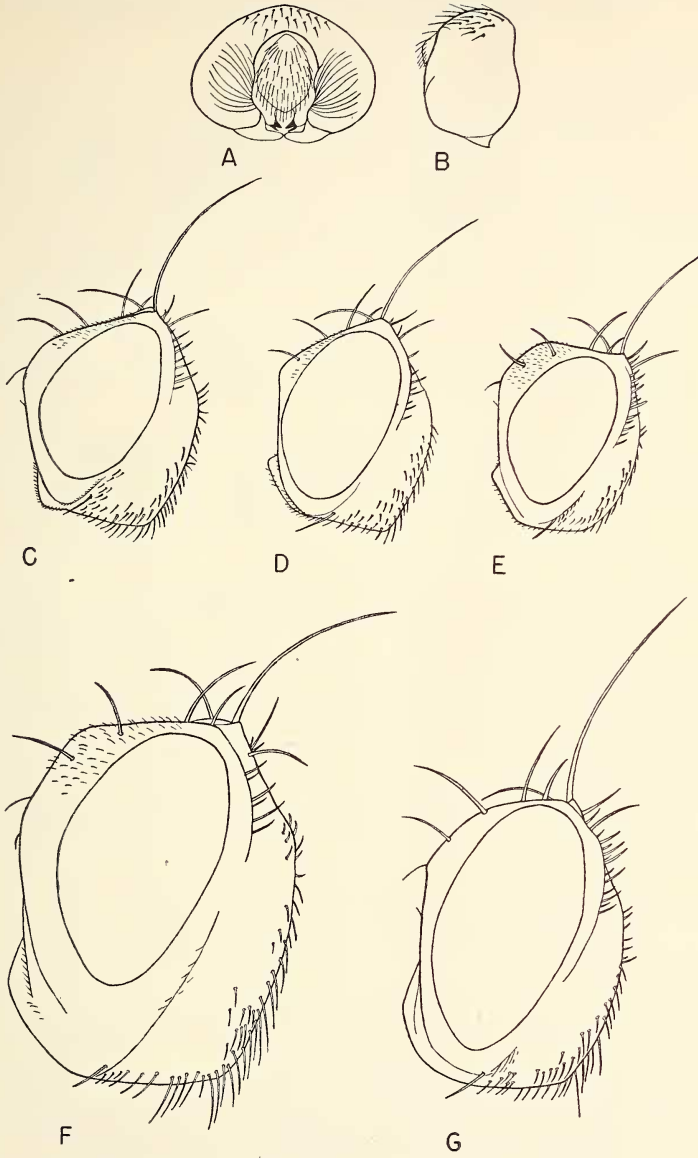


Figure 1. A, Male genitalia of *E. festiva* (anal view); B, male genitalia of *E. festiva* (side view); C, head of *E. bullans* (side view); D, head of *E. stigmatica* (side view); E, head of *E. tapetis* (side view); F, head of *E. æqualis* (side view); G, head of *E. festiva* (side view).

KEY TO THE SPECIES OF *EUARESTA* FOUND IN THE  
UNITED STATES

- 1—Thorax mainly yellow in ground color ..... 2  
 —Thorax mainly black in ground color (this color is often nearly obscured by the whitish or yellowish pollen) ..... 3
- 2—Width of cheek at least twice width of third antennal segment; whitish spot at apex of first posterior cell separated from wing margin by a distinct brown band ..... *aqualis* (Loew)  
 —Width of cheek about width of third antennal segment; whitish spot at apex of first posterior cell broadly joined to wing margin ..... *festiva* (Loew)
- 3—First posterior cell without a bulla; arista brownish at apex, yellowish at base, with central portion distinctly whitish *bullans* (Wiedemann)  
 —First posterior cell usually with at least a small bulla, if bulla absent then arista is brown with a yellowish base ..... 4
- 4—Wing with a narrow brownish band that extends posteriorly from costa, at a point midway between humeral crossvein and apex of auxiliary vein, to apex of sixth vein and a single large whitish spot crossing submarginal cell at anterior apex of small crossvein ..... *tapetis* (Coquillett)  
 —Wings without such markings ..... 5
- 5—Whitish spot, in submarginal cell, above and slightly apicad of small crossvein, broadly joined to whitish area crossing marginal cell at apex of first vein ..... 6  
 —Whitish spot, in submarginal cell, above and slightly apicad of small crossvein, never broadly joined to whitish area crossing marginal cell at apex of first vein, but usually separated by at least a narrow margin ..... 7
- 6—First basal cell with a large, subapical, nearly quadrate, whitish spot that extends completely across cell and joins broadly to third vein. .... *jonesi* Curran  
 —First basal cell with a large, rounded, subapical spot that is separated from third vein by at least a narrow margin, when this margin is so narrow as to cause doubt then the rounded condition will distinguish it ..... *bellula* Snow
- 7—Wing rather narrow, width about half or less than half the distance from humeral crossvein to apex; usually with a clearly defined brownish spot near center of stigma; ovipositor sheath of female at least 0.62 mm. in length<sup>4</sup> ..... *stigmatica* Coquillett  
 —Wing rather broad, width more than half the distance from humeral crossvein to apex; stigma never with a median brownish spot; ovipositor sheath of female at most 0.52 mm. in length. .... *bella* (Loew)

<sup>4</sup> Lengths of the ovipositor sheath as given in this study represent measurements taken dorsally from the dry specimen.



DESCRIPTION OF SPECIES<sup>5</sup>*Euaresta aequalis* (Loew)

*Trypeta aequalis* Loew, Smithsn. Inst. Misc. Collect., 6 (1): 86, tab. 2, fig. 20, 1862.

*Trypeta (Euaresta) aequalis* Loew, Smithsn. Inst. Misc. Collect., 11 (256): 308, tab. 10, fig. 20, 1873.

*Tephritis aequalis* (Loew): Coquillett, Jour. N. Y. Ent. Soc., 7 (2): 264, 1899.

*Tephritis gemella* Coquillett, Jour. N. Y. Ent. Soc., 10 (4): 181, 1902. (new synonymy).

*Ensina aequalis* (Loew): Snow, Kans. Univ. Sci. Bul., 2 (5): 219, 1903.

*Camaromyia aequalis* (Loew): Hendel, (Dresden) K. Zool. U. Anthrop.-Ethnog. Mus. Abhandl. u. Ber., Bd. 14, Nr. 3, 63, 1914.

*Euaresta (Setigeresta) aequalis* (Loew): Benjamin, U. S. Dept. Agr., Tech. Bul., (401): 50, 1934.

Head (Fig. 1, F): Width 1.14–1.88 mm., width of vertex across median ocellus 0.66–1.06 mm., length of antennæ 0.39–0.53 mm.; yellow, subshining, paler on lower half of occiput, lunula and face; usually with very thin whitish pollen except on frontale and vertex; cheeks very broad, at least twice width of first antennal segment, usually much wider; frons tumid; antennæ yellow, first segment with pale setæ, that on second yellowish brown to blackish, variable, third (Fig. 3, H); arista dark brown with yellowish base; palpi (Fig. 3, K) pale yellowish, tips darker, with pale yellow setæ basally and dark brown ones apically; proboscis yellow to brownish yellow, labellum with mixture of pale yellow and pale brownish hair; bristles yellowish.

Thorax: Mesonotum 1.54–2.66 mm. long; yellow in ground color, subshining, covered with a fine whitish to dull yellow pollen, often a spot on each side, mesad of presuturals, and a narrow area laterad of dorsocentrals is dark yellow to yellowish orange; the short flattened setæ are whitish, pale yellow, or some-

<sup>5</sup> A description of the structure of the palpus and third antennal segment is not given in the descriptions of the species. The details of these are to be found in fig. 3. The figures attempt to show the normal condition of the structures as encountered in this study, however, some variation does occur.

times with reddish tint, sparse on scutellum; scutellum usually with dark spots at basal corners, but these are occasionally absent, variable; bristles yellowish.

Legs: Wholly yellow except for front femora of males which usually have a large dark brown or black subdorsal stripe (in one male from Nampa, Idaho, 2489 feet, July 17, 1944 (W. E. Shull), this stripe is purplish); with thin whitish pollen; the setæ pale yellow to yellowish brown except for a few very short black ones on tarsi of middle and hind legs.

Abdomen: Wholly yellow, subshining, usually somewhat paler on hind margins of tergites, occasionally with dark markings on tergum, or venter, or both, often with small, dark, central spot on second tergite; with thin whitish to yellowish pollen; the short, flattened setæ whitish to pale yellow except ones on hind margin of apical tergite which are yellowish brown, that on venter fine and much shorter than on tergum; ovipositor sheath 1.06–1.76 mm. long, dark yellow, black at apex, shining, with scattered, fine, pale yellow setæ; male claspers very conspicuous, yellow, with fine brownish setæ.

Wings (Fig. 2, H): Length 4.00–6.10 mm.; brown with milky white spots and marginal indentations, darkest along anterior margin; whitish spots have tendency to become confluent and are quite variable in size; the two subapical whitish spots in discal cell are usually joined so as to form one large spot; number of setæ on third vein quite variable; first posterior cell usually without a bulla, however, rarely a faint one may be present; halteres pale yellow.

Type localities.—Of *aqualis*, Illinois, of *gemella*, Las Vegas and Hot Springs, New Mexico.

Type of *aqualis*, in the Museum of Comparative Zoology; of *gemella*, in the United States National Museum.

Food plant.—*Xanthium* sp.

Distribution.—A common and widespread species. Previously recorded from Alabama, California, Colorado, District of Columbia, Idaho, Illinois, Indiana, Iowa, Kansas, Maryland, Minnesota, Nebraska, New Mexico, New York, North Carolina, Ohio, Oregon, Pennsylvania, Virginia, and Washington. Specimens examined in this study were from the following

localities—ARKANSAS: Scott County. CALIFORNIA: Onyx; Winters; Three Rivers; Big Clear Lake; Lake County; Riverside; Costa Mesa; San Diego; Stockton; Palo Alto. COLORADO: Trinidad; Grand Junction; Maybell; Canon City; Colorado Springs; Roggen; Springfield; Agate; Sterling; Fruita. IDAHO: Lewiston; Deer Field. ILLINOIS: Chicago. IOWA: Webster City; Ames. KANSAS: Atchison County. MISSISSIPPI: Oxford. MONTANA: Whitehall. NEBRASKA: Lincoln; Broken Bow; War Bonnet Canyon; Glen; South Sioux City; Omaha. NEW JERSEY: Salt Meadows; Newark. NEW MEXICO: "South-east of Raton." NEW YORK: Babylon; Irving; N. Evans; East Aurora; Lancaster. OHIO: Summit County. OKLAHOMA: Stillwater; Shattuck; Optima. OREGON: Prineville; Nyssa; Nampa. PENNSYLVANIA: Philadelphia. UTAH: Roy; Syracuse; Kaysville; Taylor; Tremonton; Sunset; Dry Lake; Duchesne; Spanish Fork; Moab; Ogden; Logan Canyon; Vernal; Myton; Springfield; Blue Creek. VIRGINIA. WASHINGTON: Coulee City; Wawawai. WISCONSIN. WYOMING: Cody; Buck Creek. Early May to late September.

One hundred and ninety-two specimens of this species were examined in this study.

A specimen of *aqualis* was sent to Dr. Stone for comparison with the type of *gemella* and the two were found to be identical. While this synonymy has apparently been recognized previously by other workers a published account of it has not been found by the author.

*Euaresta festiva* (Loew)

*Trypeta festiva* Smithsn. Inst. Misc. Collect., 6 (1): 86, tab. 2, fig. 21, 1862.

*Trypeta (Euaresta) festiva* (Loew), Smithsn. Inst. Misc. Collect., 11 (256): 309, tab. 10, fig. 21, 1873.

*Euaresta festiva* (Loew): Coquillett, Proc. U. S. Nat. Mus., 37 (1719): 540, 1910. (designated genotype).

Head (Fig. 1, G): Width 0.95–1.55 mm., width of vertex across median ocellus 0.48–0.78 mm., length of antennæ 0.34–0.45

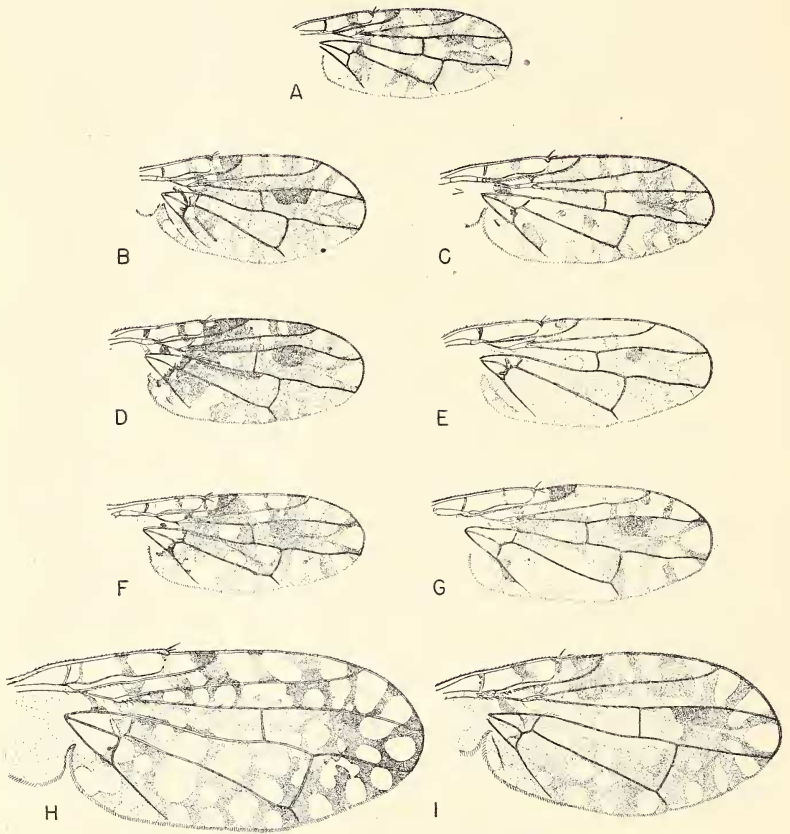


Figure 2. Wings of species of *Euaresta*. A, *E. tapetis*; B, *E. bella*; C, *E. bullans*; D, *E. bellula*; E, *E. stigmatica*; F, *E. jonesi*; G, *E. jonesi*; H, *E. æqualis*; I, *E. festiva*.

mm.; yellow, paler on lower half of occiput, cheeks, face, parafacials and parafrontals; with dull yellow pollen on upper half of occiput, and whitish to pale yellow on remaining areas, except frontale which is bare; antennæ yellow, first segment with pale yellow setæ, second with yellowish brown, third (Fig. 3, E); arista brown with yellowish base; palpi (Fig. 3, L) pale yellow, with pale setæ basally and brown ones apically; proboscis dark yellow, labellum with pale yellowish hair; lower frontoorbitals, anterior pair of upper frontoorbitals, ocellars, inner verticals and genal yellowish brown, remaining bristles and short setæ pale.

Thorax: Mesonotum 1.04–2.07 mm. long; wholly yellow except for a small, dark spot, on either side of scutellum at basal corners, which may or may not be present, variable, and the usual dark spot behind wing base; densely golden yellow pollinose except on upper half of postnotum which is bare (occasionally propleura, sternopleura, and fore half of mesopleura somewhat whitish); the short, flattened setæ pale yellow, sparse on scutellum; bristles yellowish brown except for posterior notopleurals, sternopleurals, and pteropleurals which are pale.

Legs: Wholly yellow; all coxæ and the front femora whitish pollinose, rather thin on latter; the setæ pale yellow to brownish.

Wings (Fig. 2, I): Length 2.88–4.84 mm.; pale to dark brown with milky white spots and marginal indentations; stigmal markings variable as follows: wholly whitish except for a brownish subtriangular spot on costal margin, wholly brownish except for a basal whitish spot, a basal and a subapical whitish stripe each of which crosses the cell completely, or marked as shown in the figure; that portion of apical whitish stripe in marginal cell that extends into submarginal cell often divided in latter; occasionally two small, faint spots present, one on either side of small crossvein next to the third vein; occasionally a small whitish spot may be present either apicad or basad of large subapical whitish spot in first basal cell; bulla in first posterior cell sometimes faint in those specimens in which brownish color is rather pale; the setæ on third vein quite variable in number and size; halteres yellow.

Abdomen: Wholly yellow, except for occasional dark markings

on venter, subshining, with very thin pale yellow pollen; tergum with short, fine brownish setæ, that on hind margin of apical tergite longest; venter with very fine, pale yellow setæ; ovipositor sheath 0.78–1.29 mm. long, flattened or conical, yellow, brownish yellow, or occasionally dark brown, the apex black; with fine yellowish brown setæ; male claspers yellowish to dark brown, shining, with fine yellowish brown setæ.

Type locality.—Pennsylvania.

Type in the Museum of Comparative Zoology.

Food plant.—Unknown.

Distribution.—Previously recorded from Connecticut, Illinois, Kansas, Minnesota, Nebraska, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Dakota, and Virginia. Specimens examined in this study were from the following localities—ARKANSAS: Polk County. COLORADO: La Porte. IOWA: Iowa City. ILLINOIS: Chicago. KANSAS: Douglas County; Osborne County; Smith County. KENTUCKY. NEBRASKA: South Sioux City; Omaha; Sowbelly Canon; Sioux County; Phillips; Brookings. NEW YORK: New York City; Flushing; Ithaca. OHIO: Summit County. VIRGINIA: Charlottesville; Great Falls. WYOMING: Lusk. Early June to late August.

One hundred and ten specimens of this species were examined during this study including two females and one male labeled, "homotype, compared by S. C. Harriot."

*Euaresta tapetis* (Coquillett)

*Trypeta* (*Euaresta*) *tapetis* Coquillett, Canad. Ent., 26: 75, 1894.

*Euaresta tapetis* (Coquillett), Kans. Univ. Sci. Bul. 2 (5): 219, 1903. (lapsus).

Head (Fig. 1, E): Width 0.81–1.18 mm., width of vertex across median ocellus 0.42–0.62 mm., length of antennæ 0.27–0.34 mm.; front usually quite tumid, but occasionally only slightly so, variable; frontale yellow to yellow orange; face, parafrontals, parafacials and cheeks usually pale yellow; lunule whitish to pale yellow; ocellar triangle and a somewhat V-shaped spot on upper half of occiput black, with cinereous pollen, this color also forming a narrow stripe on each side of ocellar region

to upper frontorbitals; antennæ yellow, first and second segments with pale setæ, third (Fig. 3, D); arista brown with yellowish base; palpi (Fig. 3, M) pale yellow to yellow, with short, pale setæ basally and brownish ones apically; proboscis yellowish brown, labellum with pale hair; lower frontorbitals, anterior pair of upper frontorbitals, ocellars, inner verticals, and genal yellowish, remaining bristles and short setæ pale.

Thorax: Mesonotum 0.90–1.40 mm. long; black except for following yellowish areas: humeri, notopleura, propleura, prosternum, mesopleura except for large, central, dark spot that extends upward from sternopleural suture, wing base, scutellum (sometimes marked with blackish at base), and upper half of postnotum (occasionally wholly dark); cinereous pollinose on dark areas, this color occasionally replaced with yellowish on dorsum; yellowish areas with pale yellow to thin cinereous pollen except on upper half of postnotum which is bare; rather thinly covered with short, flattened, pale yellow (occasionally reddish) setæ that are densest on dorsum, usually absent on scutellum, longest on propleura and sternopleura; bristles on dorsum yellowish, those on pleura pale.

Legs: Wholly yellow, with whitish pollen on front femora and all coxæ, densest on latter; coxæ and femora of front pair of legs with whitish setæ, that on remainder of legs pale yellowish except for some brownish intermixed on tibiæ and tarsi of middle and hind legs.

Wings (Fig. 2, A): Length 2.60–3.61 mm.; brown with milky white spots and marginal indentations; two or three spots in marginal cell between apices of first and second veins, variable; spot in apex of submarginal cell, two spots lying just before large marginal spot in first posterior cell, and apical spot in second posterior cell often uniting to form a narrow subapical band; first posterior cell usually with a small inconspicuous bulla which is quite often absent; second posterior cell usually with three narrow spots, basal pair often uniting to form one, or occasionally all three uniting as figured; two or three large spots in discal cell, variable; whitish band crossing wing from apex of auxiliary vein to apex of sixth vein often interrupted by brownish color filling base of submarginal cell; halteres yellow.

Abdomen: Wholly shining yellow except as follows: occasionally with brown or black markings on anterior portion of tergites, and a dark brown, nearly black, central spot on first sternite; with very thin cinereous pollen; setæ pale yellow, longest laterally and on hind margin of apical tergite; ovipositor sheath 0.36–0.52 mm. long, shining brown or black, variable, with very short, fine, brownish setæ; male claspers mainly dark brown, occasionally yellowish dorsally, with fine, short, yellowish brown setæ.

Type locality.—New Mexico.

Type in the United States National Museum.

Food plant.—Unknown.

Distribution.—Previously recorded from Colorado, Kansas, and New Mexico. Specimens examined in this study were from the following localities. COLORADO: Roggen; La Porte; Boulder County; Fort Collins; Canon City; Grand Junction; Colorado Springs; Palisade; Maybell. IDAHO: Bliss Wieser. KANSAS: Morton County. NEW MEXICO: Espanola; Albuquerque; Las Vegas; Jemex Springs. OREGON: Hood River. UTAH: Lusk; Clinton; Myton; Knab; West Point; Provo; Ogden; Duschene; Zion National Park; Moab; Bothwell; Cornish. FLORIDA: Yankeetown. Dr. Stone has furnished the following additional locality—WASHINGTON: Wawawai (one specimen in the U. S. National Museum). Early June to late August.

Fifty-eight specimens were examined including a female compared with the type by Dr. Alan Stone.

This species appears to be closest to *bullans* (Wiedemann) in regards to the wing structure and pattern, but shows rather marked differences in the head characteristics.

*Euaresta bullans* (Wiedemann)<sup>6</sup>

*Trypeta bullans* Wiedemann, Auss. Zweifl. Ins., 2, p. 506, 1830.

*Euaresta adspersa* Coquillett, Invertebrata Pacifica, 1: 30, 1904.  
(new synonymy).

*Camaromyia bullans* (Wiedemann): Hendel, Wiener Ent. Ztg., 33 (3–4: 95, 1914.

<sup>6</sup> The description of the head and thoracic bristles of *bullans* will serve for the remaining species also and thus are not repeated.



*Tephritis wolffi* Cresson, Ent. News, 42 (1) : 5, 1931. (new synonymy).

*Euaresta (Camaromyia) bullans* (Wiedemann) : Benjamin, U. S. Dept. Agric. Tech. Bul., (401) : 50, 58, 1934.

In this synonymy only those proposed species that appear to occur in the United States are listed.

Head (Fig. 1, C) : Width 1.06–1.26 mm., width of vertex across median ocellus 0.56–0.67 mm., length of antennæ 0.39–0.45 mm.; mainly white or pale yellow; frontale dark yellow to yellow orange, this color often extending posteriorly on to occiput; ocellar triangle and a pair of elongate spots on occiput, which extend diagonally towards inner verticals and are often united at occipital foramen to form V-like structure, black; pollen mainly whitish, that on upper half of occiput usually mixed with dull yellow; both sexes with first antennal segment whitish or pale yellow and second yellowish brown, third segment in female usually slightly darker than second, in male (Fig. 3, F) black except for brownish base; apical half of arista black and very slender, the more thickened basal half white except for extreme base which is yellowish; palpi (Fig. 3, P) very pale yellow, tip usually somewhat darker, with short, pale setæ that are occasionally intermixed with a few brownish ones at apex; proboscis mainly pale yellow, labellum darker, with fine, pale hair; lower frontoorbitals, anterior pair of upper frontoorbitals, ocellars, inner verticals, and genal brown; remaining bristles and short setæ pale.

Thorax : Mesonotum 1.23–1.62 mm. long; black in ground color except for following yellowish areas: humeri, prosternum, scutellum, and upper half of postnotum; propleura, notopleura, and fore part of mesopleura yellowish or dark, variable; with rather dense cinereous pollen on dark areas, this color occasionally somewhat obscured on dorsum with yellowish, except at extreme anterior region of prescutum, that on pale areas mostly yellowish; with short, flattened, yellowish setæ which are denser on dorsum, those on lower pleural areas somewhat whitish; bristles brown except for posterior notopleurals, sternopleurals, and pteropleurals which are pale.

Legs: Yellow, coxæ paler; with thin grayish pollen which is

densest on coxæ; the setæ mainly whitish and pale yellow, with some brownish intermixed on tibiæ and tarsi.

Wings (Fig. 2, C): Length 2.91–3.86 mm.; dark brown with large milky spots and marginal indentations as figured; halteres yellow.

Abdomen: Yellow, subshining, first to fifth tergites marked with black on anterior half, this color usually most pronounced laterally, with pale yellow and whitish setæ which are longest on lateral margins and on hind margin of apical segment; cinereous pollinose; venter yellow, anterior half of sternites blackish, with a brown shiny spot on first visible sternite; thinly cinereous pollinose; with very fine pale setæ; ovipositor sheath 0.64–0.73 mm. long flattened or conical, color variable, usually black, often brown, or a combination of brown or black, with pale setæ (as found on abdomen) on basal three-fourths dorsally and ventrally, apex bare or with very fine, short setæ; male claspers yellow, occasionally marked with brown laterally, with fine pale setæ.

Type locality.—Of *bullans*, Montevideo, Uruguay; of *adpersa*, Stanford University, Palo Alto, California; of *wolffi*, Pomona and Visalia, California.

Type of *adpersa* in the United States National Museum; of *wolffi*, in the Academy of Natural Sciences at Philadelphia; of *bullans*, in the Naturhistorisches Museum at Vienna, Austria.

Food plant.—Unknown.

Distribution.—Previously recorded only from California, as *adpersa* and *wolffi*. Specimens examined in this study were from the following localities. CALIFORNIA: Alhambra; Salinas; Lower Lake, Clear Lake; San Joaquin County; Monterey; Los Angeles; Santa Clara County; Redondo Beach. Late April to early September.

In addition to the above localities material was examined from—CHILE. BRAZIL: Rio de Janeiro. URUGUAY. AUSTRALIA: Botany Bay and Illawarra, New South Wales.

Twenty-nine specimens of this species were examined in this study including a female compared with the type of *adpersa* by

Dr. Alan Stone, and a female compared with the females in the type series of *wolffi* by Dr. E. T. Cresson, Jr.

Two females (Alhambra, California, 6-3-1919 (R. E. Campbell), in the United States National Museum) were sent, one to Dr. Alan Stone, and one to Dr. E. T. Cresson, Jr. for comparison with the types of *adpersa* Coquillett and *wolffi* Cresson respectively. In each case the specimens being compared were found to be in good agreement with the types, with Dr. Cresson stating that the female received by him was identical with the females in the type series of *wolffi*. Since both these specimens agree with each other in every respect there seems to be no reason for doubting that *wolffi* and *adpersa* are the same species. The specimens, from the localities outside the United States, received from Dr. Stone and Dr. Hering and which are determined as *bullans* Wiedemann, are identical with the above mentioned females from Alhambra, California. Those received from Hering were determined by him while those from Stone bear determination labels of Kertesz, Bezzi, Malloch, and Stone. A comparison of the wing patterns of the Alhambra females with the figure of *bullans* as given by Hendel (8) revealed that they were identical. In addition these specimens were found to agree quite well with the description of *bullans* as given by Hendel. With such evidence at hand there seems no reason to doubt that *adpersa* and *wolffi* are actually *bullans*.

*Euaresta jonesi* Curran

*Euaresta jonsi* Curran, Amer. Mus. Nov., (526): 9, Fig. 7, 1932.

Head: Width 1.01-1.18 mm., width of vertex across median ocellus 0.56-0.64 mm., length of antennæ 0.34-0.39 mm.; mainly pale yellow, frontale dark yellow, a spot on upper half of occiput and ocellar triangle black; occiput and ocellar triangle with cinereous and dull yellow pollen intermixed, this color forming a narrow stripe on either side of ocellar triangle to upper fronto-orbitals; antennæ yellow (second segment occasionally with dark marks laterally), first two segments with short, brown setæ, third (Fig. 3, B); arista brown with yellowish base; palpi (Fig. 3 N) pale yellow, with whitish setæ basally and brownish ones apically;

proboscis yellow, with fine yellowish hair; oral margin occasionally with a few brownish setæ anteriorly.

Thorax: Mesonotum 1.15–1.60 mm. long; black in ground color except for humeri, upper half of postnotum, and tip of scutellum which are yellowish; covered with cinereous pollen which is often thinly intermixed with dull yellow on dorsum, mesopleura, and notopleura; dorsum with short, flattened, pale yellowish setæ which extends only sparsely onto scutellum, a few at extreme anterior region of preescutum and those on humeri and pleural areas more whitish.

Legs: Brownish yellow, outer side of front femora darkest, front and middle coxæ usually marked with black; coxæ, femora, and tibiæ cinereous pollinose, densest on front and middle coxæ; setæ on coxæ and front femora whitish, that on remainder of legs varying from yellowish to brown.

Wings (Fig. 2, F–G): Length 2.97–3.58 mm.; dark brown, with milky white spots and marginal indentations which are quite variable in size and are often confluent; the variations shown in the figures were found in specimens from both the De Lake, and Sand Lake areas; the small whitish area shown in apex of the marginal cell (Fig. 2, F) is also present in the paratype examined in this study; there is often a small yellowish spot near apex of stigmal cell in addition to spot at base; halteres pale yellow.

Abdomen: Shining brownish yellow except as follows: apical two tergites of females usually marked with brown, males with first and fifth tergites dark brown to black; the short, flattened setæ on lateral margins and whole of anterior two tergites pale yellow, that on remaining tergal areas brownish to black; venter yellowish, subshining, with small, shiny brownish spot on first visible sternite; cinereous pollinose; with fine, pale yellow setæ; ovipositor sheath 0.78–1.00 mm. long, flattened or conical, shining black, with fine brownish setæ; male claspers shining black, with very fine brownish setæ.

Type locality.—De Lake, Oregon.

Type in the American Museum of Natural History.

Food Plant.—*Franseria* sp. (= *Gærtneria*).

Distribution.—Previously recorded only from the type locality.

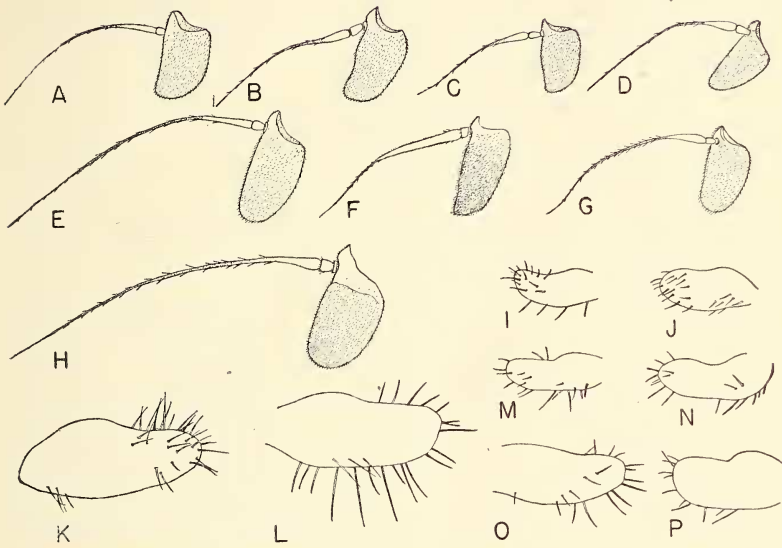


Figure 3. A through H, showing third antennal segment; I through P, showing palpus, of species of *Euaresta*. A, *E. stigmatica*; B, *E. jonesi*; C, *E. bellula*; D, *E. tapetis*; E, *E. festiva*; F, *E. bullans*; G, *E. bella*; H, *E. æqualis*; I, *E. bellula*; J, *E. bella*; K, *E. æqualis*; L, *E. festiva*; M, *E. tapetis*; N, *E. jonesi*; O, *E. stigmatica*; P, *E. bullans*.

Specimens examined during this study were from the following localities. OREGON: De Lake; Sand Lake, Tillamook County. WASHINGTON: Westport. Early June to late August.

Twenty specimens of this species were examined in this study including one of the paratypes which was kindly loaned by Dr. C. H. Curran.

This species is closest to *bellula* Snow, differing, in addition to the characters indicated in the key and the figures, by having a somewhat longer ovipositor sheath.

*Euaresta bellula* Snow

*Euaresta bellula* Snow, Kans. Univ. Quar., 2 (3): 172, January, 1894.

*Trypeta (Euaresta) stelligera* Coquillett, Canad. Ent., 26 (3): 74, March, 1894. (new synonymy).

Head: Width 0.62–1.18 mm., width of vertex across median ocellus 0.34–0.64 mm., length of antennæ 0.22–0.35 mm.; mainly pale yellow, frontale dark yellow, occasionally narrowly brownish next to lunula; lunula whitish to pale yellow; a large spot on upper half of occiput and occasionally a portion of the lower half, usually a small spot directly behind postverticals, and ocellar triangle black; whole of occiput and ocellar triangle with cinereous and dull yellow pollen intermixed, this color forming a narrow stripe on either side of ocellar triangle to upper fronto-orbitals; antennæ yellow, second segment often marked with faint dark spots, first segment with pale setæ, that on second dark, third (Fig. 3, C); arista dark brown with yellowish base; palpi (Fig. 3, I) pale yellow, with pale setæ basally and dark brown ones apically; proboscis brownish yellow with fine, pale yellow hair; oral margin occasionally with a few short brownish setæ anteriorly.

Thorax: Mesonotum 0.67–1.48 mm. long; subshining, black in ground color except for apex of scutellum which is yellowish; humeri and a narrow area extending ventrally, upper half of postnotum, and notopleura yellowish or dark, variable; covered with cinereous pollen, that on dorsum, notopleura, and a spot on mesopleura, usually intermixed with, or occasionally nearly

replaced by, yellowish; the short, flattened setæ are usually whitish but occasionally are yellowish or tinged with reddish, variable.

Legs: Color quite variable, but mainly yellow; coxæ wholly yellow or with dark markings; femora occasionally marked with brown or black as follows: front femora on posterior side except at apex, and middle and hind femora ventrally on basal half; coxæ and femora cinereous pollinose, densest on former; setæ of coxæ and front femora whitish to pale yellow, that on remainder of legs yellowish brown to brown except for a few on tarsi of middle and hind legs which are nearly black.

Wings (Fig. 2, D): Length 1.85–3.53 mm.; brown with milky white spots and marginal indentations; occasionally there is a small whitish spot at apex of marginal cell; large round whitish spot in first basal cell not reaching third vein; whitish spots in discal cell varying from one to four; whitish spots in second posterior cell variable in size, usually two or three in number, or often joined to form one large spot; with or without a small pale brownish spot on alula; halteres pale yellow.

Abdomen: Subshining, varying from bright yellow to brownish yellow in ground color, and usually variously marked on dorsum with brown or black, at least one or more of tergites showing these colors in all cases and especially in the males in which the apical segment was found without exception to be marked with some dark brown or black; thinly whitish to grayish pollinose; venter colored much as on dorsum except first sternite always with median dark brown spot; the setæ on dorsum varying from pale yellowish to dark brown, that on lateral margins usually wholly pale, that on venter very fine and pale to light brownish; ovipositor sheath 0.50–0.90 mm. long, brown or black, flattened or conical, with short, fine, brownish yellow to brown setæ; male claspers dark brown to black, occasionally paler dorsally, with fine brownish setæ.

Type locality.—Of *bellula*, Arizona; of *stelligera*, Southern California.

Type of *stelligera* in the United States National Museum; of *bellula* in the Snow Entomological Collection at the University of Kansas. The cotype series of *bellula* is composed of

one male and three females as opposed to the information given by Snow (14).

Food plant.—Unknown.

Distribution.—Previously recorded from Arizona, California, and Oregon. Specimens examined in this study were from the following localities. ARIZONA: Tucson; Douglas; Baboquivari Mountains; Prescott; Chiricahua Mountains; Chiricahua National Monument; Bill Williams Fork. CALIFORNIA: Santa Cruz; San Onofre; San Francisco; San Diego; Carmel; Mulege Baja; Ventura; Huntington Beach. NEW MEXICO: Clouderoft; Magdalena; Ruidoso. WASHINGTON: Puyallup; "Whidby I."; Seattle. Early May to early September.

One hundred and forty-one specimens of this species were examined during this study including a male compared with the type of *stelligera* by Dr. Alan Stone.

The cotypes of *bellula* were examined and a male specimen that agreed well with the males of the cotype series was sent to Dr. Stone to be compared with the type of *stelligera*. Dr. Stone considered the specimen to agree very closely with the type of *stelligera* except for the number of whitish spots in the discal cell. Since this character has proven to be quite variable it does not seem to be significant. Also in answer to a question concerning the glabrous condition of the abdomen of *stelligera* as originally described by Coquillett (2), Dr. Stone has written, "Coquillett was apparently using glabrous in the sense of polished or he was not using enough power, since the type shows abundant fine hair on the abdomen." In addition, the coloration of the abdomen has been found to be so variable as to be of no significance in attempting to separate the species in question. With the above information at hand it seems necessary to treat *stelligera* as a synonym of *bellula*.

Certain structural differences were noted, in addition to the color variations mentioned in the descriptions, namely the narrower condition of the cheeks and the somewhat less elongate ovipositor tip in the females from Arizona and New Mexico. These differences seemed, however, to be more of a degree of variation than of sharp divergence. Further examination of a



longer series in addition to a study of the biology may, however, reveal this to be a complex of more than one species.

*Euaresta stigmatica* Coquillett

*Euaresta stigmatica* Coquillett, Jour. N. Y. Ent. Soc., 10 (4): 180, 1902.

Head (Fig. 1, D): Width 0.84–1.06 mm., width of vertex across median ocellus 0.36–0.50 mm., length of antennæ 0.26–0.36 mm.; mainly yellow, face, cheeks, parafacials, and parafrontals paper; lunula whitish; ocellar triangle, occiput, except for upper and lower margins, black, densely cinereous pollinose; sometimes a small brownish spot is present at base of postverticals; antennæ brownish yellow, first segment with pale setæ, second with brownish, third (Fig. 3, A); arista dark brown with yellowish base; palpi (Fig. 3, O) pale yellow, with pale yellow setæ basally and brownish ones apically; proboscis brownish yellow, with fine pale hair; oral margin occasionally with a few short brownish setæ anteriorly.

Thorax: Mesonotum 0.90–1.48 mm. long; black in ground color except for humeri, anterior margin of mesopleura, occasionally a small portion of notopleura, and apex of scutellum which are tinged with brownish yellow, and upper half of postnotum which is pale yellow; mainly cinereous pollinose (a few specimens showed a tendency for pollen on dorsum to be dull yellow) often with an inconspicuous, pale brownish spot on mesopleura; the short, flattened setæ whitish, pale yellow, or reddish, variable.

Legs: Yellow to brownish yellow; cinereous pollinose, densest on coxæ and femora; setæ on coxæ and front femora whitish, that on front tibiæ and tarsi, and middle and hind legs pale yellow and brownish intermixed.

Wings (Fig. 2, E): Length 2.80–3.64 mm.; brown pattern with milky white spots and marginal indentations; brown spot in stigma varying in size, occasionally crossing cell entirely (one specimen with stigma wholly dark); first posterior cell often with a few small spots in addition to large ones near apex; spots in discal cell variable but usually with three large ones arranged as figured; basal spot in second posterior cell may be divided so as to form two spots; halteres yellow.

Abdomen: Shining yellow, dorsum marked with brown or black as follows: fifth tergite in male dark brown to black on anterior half or more, tergites one to four of males and all tergites of female occasionally irregularly marked with brown, this color usually on anterior margin of tergites; dorsum with pale yellow setæ which are usually intermixed with some brownish except on tergites one and two, longest on lateral margins and on posterior margin of apical segment; with very thin cinereous pollen; venter with short whitish setæ; a small spot on first visible sternite is brownish; cinereous pollinose; ovipositor sheath 0.62–0.84 mm. long, flattened or conical, dark brown or black, variable, with very fine brownish setæ that are densest basally; male claspers dark brown to black, with very fine pale setæ.

Type locality.—Flagstaff and Williams, Arizona.

Type in the United States National Museum.

Food plant.—*Franseria acanthicarpa* (Hook) Coville.

Distribution.—Previously recorded from Flagstaff and Williams Arizona, type series. Specimens examined in this study were from the following localities. ARIZONA: Tucson; Mesa; Bill Williams Fork; Chiricahua Mountains; Flys Peak, Cochise County; Oak Creek Canyon; Mustang Mountains; Santa Rita Mountains; Coconino County. CALIFORNIA: San Jacinto Mountains; (Famosa?); Palmdale; Whitewater; Big Bear Lake; Onyx. NEW MEXICO: Espanola; Mesilla; Magdalena. UTAH: Zion National Park; Pintura. Early June to early December.

Sixty-nine specimens of this species were examined in this study including a male compared with the type by Dr. Alan Stone.

This species is close to *bella*, differing in the characters indicated in the key and by the figures.

*Euaresta bella* (Loew)

*Trypeta bella* Loew, Smithsn. Inst. Misc. Collect., 6 (1): 88, pl. 2, fig. 23, 1862.

*Trypeta (Euaresta) bella* (Loew), Smithsn. Inst. Misc. Collect., 11 (256): 311, pl. 10, fig. 23, 1873.

*Euaresta (Euaresta) bella* (Loew): Benjamin, U. S. Dept. Agr. Tech. Bul. (401): 50, fig. 35, 1934.

Head: Width 0.67–1.20 mm., width of vertex across median ocellus 0.31–0.59 mm., length of antennæ 0.22–0.36 mm.; face, cheeks, parafacials and parafrontals usually pale yellow (occasionally whitish), frons, vertex and occiput darker yellow; ocellar triangle and a V-shaped mark on upper half of occiput black; occiput and ocellar region with cinereous and dull yellow pollen intermixed, this color forming a narrow stripe (often hardly distinguishable) on either side of ocellar triangle to upper fronto-orbitals; antennæ yellow, third segment often tinged with brownish, first with pale setæ, second with dark, third (Fig. 3, G); arista black with yellowish base; palpi (Fig. 3, J) mainly pale yellow, apex darker, with pale yellow setæ basally and brownish ones apically; proboscis yellow with pale yellow hair.

Thorax: Mesonotum 0.78–1.57 mm. long; ground color black except for following yellowish areas: humeri, notopleura, a narrow area above front pair of coxæ that extends upward to humeri (occasionally obscured by cinereous pollen), wing base, upper half of postnotum, and apex of scutellum; heavily cinereous pollinose on dark areas, yellow pollinose on light areas (except for upper half of postnotum which is bare) this color usually extending over upper half of mesopleura, dorsum and scutellum so as to nearly obscure cinereous appearance; the short, flattened setæ, whitish to pale yellow; one specimen (a female from Oak Creek Canon, Arizona, 6,000 feet, August (F. H. Snow), in the Snow Entomological Collection at Kansas University) has an additional, rather pale, bristle on left margin of scutellum.

Legs: Yellow to brownish yellow; coxæ heavily whitish to grayish pollinose, femora thinly so; coxæ and front femora with whitish setæ (occasionally a few in ventral row of latter are yellowish), those on remainder of legs mostly brownish with some yellowish intermixed.

Wings (Fig. 2, B): Length 3.02–3.81 mm.; brown with milky white spots and marginal indentations; whitish stripe across basal area of stigmal cell usually slightly wider than shown in figure; whitish area across apex of marginal cell occasionally divided so as to form two spots; a small, round, whitish sub-basal spot is present in submarginal cell of one specimen (a male from Douglas County, Kansas, in the Snow Entomological Col-

lection at Kansas University); whitish spots in discal cell vary from two to five in number with the usual condition as figured; occasionally a small whitish spot in base of first posterior cell; halteres yellowish.

Abdomen: Shining yellowish to brownish yellow in ground color, with dark markings on tergal areas as follows: female—tergites five and six each with two dark brown to blackish spots, those on sixth usually confluent and nearly covering whole of tergite, those on fifth quite variable in size, remaining tergites with or without dark markings, variable; male—apical tergite usually wholly dark brown or black except for a small, yellowish, spot on hind margin, occasionally dark marking is reduced to a spot at each anterolateral corner; preceding tergites with or without dark markings, variable; setæ mainly whitish to pale yellow that on hind margin of apical tergite brownish, longest laterally and on hind margins of tergites; pollen thin, whitish, and usually discernible only on dark areas; venter yellowish, first sternite with dark brown, shiny spot, remaining sternites often marked with some darkish; thinly whitish pollinose; with pale yellow setæ; ovipositor sheath 0.45–0.52 mm. long, shining black, flattened or conical, with very fine, short, pale brownish setæ; male claspers brown or black, with fine, pale brown setæ. Type locality.—Washington and New York.

Type in the Museum of Comparative Zoology.

Food plant.—Unknown.

Distribution.—A common and widespread species. Previously recorded from District of Columbia, Florida, Georgia, Illinois, Iowa, Kansas, Michigan, Minnesota, Nebraska, New Hampshire, New Jersey, New York, North Carolina, South Dakota, Tennessee, Texas, Washington and Wisconsin. Specimens examined in this study were from the following localities: ARIZONA: Oak Creek Canon; "Southern Arizona." DISTRICT OF COLUMBIA. COLORADO: Boulder; La Porte; Fort Collins. CONNECTICUT: New Haven. FLORIDA: Lower Matecumbe Key; Orlando. ILLINOIS: Chicago; Calumet. KANSAS: Lawrence; Leavenworth County; Douglas County; Decatur County; Norton County; Republic County; Atchison County; Har-

vey County; Doniphan County; Smith County; Coffee County; Osborne County; Trego County; Onaga; Mitchell; Fort Logan; Riley County. MAINE: Orono. MASSACHUSETTS: Riverside; Auburndale; Greenfield; Belmont. MISSISSIPPI: Pass Christian. NEBRASKA: Lincoln; Glen; Sand Hills; War Bonnet Canyon; South Sioux City. NEW JERSEY: Riverton. NEW YORK: Washington Heights; Lancaster; Irving; Crugers; Boston; N. Evans; Ithaca; New York City; Rochester; Babylon. NORTH CAROLINA: "Black Mountains"; Franklin. OHIO: Summit County. PENNSYLVANIA: Swarthmore; Dupont; Philadelphia. SOUTH DAKOTA. TENNESSEE: Knoxville. TEXAS: Donna; Brazoria County; Hidalgo County. UTAH: King's Station; Springville; Spanish Fork. WISCONSIN: Milwaukee. WYOMING: Lance Creek; Lusk. Early March to early October.

Two hundred and forty-seven specimens were examined including a female compared with the type by Dr. Joseph Bequaert.

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